Observations of Occultations of Stars by the Moon (with the deduced Equations between the Errors of the Lunar Elements); and of Phenomena of Jupiter's Satellites; made at the Radcliffe Observatory, Oxford, in 1871 and 1872.

(*Communicated by the Radcliffe Observer.*)

Occultations.

No.	Day of Observation.	Phenomenon.	Moon's Limb.	Oxford Mean Solar Time. h m s	
	1871.				
1	Oct. 23	Dis. of τ^1 Aquarii	Dark	8 32 28·0	M.
2	,,	Dis. of τ^2 Aquarii	Dark	9 42 43·1	M. & L.
3	,,	Reapp. of τ^2 Aquarii	Bright	10 53 20·9	M.
4	Nov. 15	Dis. of λ Sagittarii	Dark	5 9 23·4	M. & K.
5	16	Dis. of h^2 Sagittarii	Dark	6 55 46·4	,,
6	18	Dis. of ε Capricorni	Dark	6 57 55·0	,,
7	27	Dis. of ι Tauri	Bright	10 3 20·8	M.
8	,,	Reapp. of ι Tauri	Dark	11 18 23·4	,,
9	Dec. 1	Dis. of γ Cancri	Bright	18 0 58·4	,,
10	,,	Reapp. of γ Cancri	Dark	19 13 9·0	M. & K.
11	20	Dis. of ν Piscium	Dark	12 44 43·9	L. & K.
12	,,	Reapp. of ν Piscium	Bright	13 17 3·6	K.
	1872.				
13	Jan. 23	Dis. of ω Geminorum	Imperfect	6 3 11·4	L.
14	Apr. 13	Reapp. of 5 Geminorum	Bright	7 59 22·5	K.
15	18	Dis. of B.A.C. 3579	Dark	7 51 48·4	M.
16	May 22	Reapp. of ω^2 Scorpii	Bright	10 53 7·6	,,

Oct. 23. All these observations good, and the phenomena instantaneous; the sky was rather cloudy.

Nov. 15. The two observers give the same tenth of a second; the disappearance was very sudden at the beat of the Heliometer clock. No projection on the obscure disk of the Moon, which was distinctly visible. [M.]

Nov. 16. Good; the mean of the observed seconds, 46·0 and 46·8, is taken. The altitude of the star was 2° 21′.

Nov. 18. Good; the star vanished suddenly exactly at the edge of the obscure disk, which was visible; the mean of the observed seconds, 54·9 and 55·1, is taken.

Nov. 27. Disappearance of ι *Tauri*; the observation pretty good, though the disk was considerably obscured by clouds. For the reappearance K gave $24^s{\cdot}3$.

Dec. 1. Disappearance of γ *Cancri;* pretty good. The reappearance was instantaneous. [M.] K gave the same tenth very nearly.

Dec. 20. The two observers agree within a tenth. The Moon tremulous at reappearance.

1872, April 18. Instantaneous.

May 22. The Moon slightly eclipsed, and exactly full; the observation very good. The other observations of this evening were prevented by trees, which were in the way of the Heliometer.

In the following table of the errors of lunar elements resulting from the occultations the Greenwich notation is used, and the ele-

ments of the *Nautical Almanac* uncorrected. All the computations have been made by Mr. Main by the method given in his treatise on *Spherical and Practical Astronomy*.

The observations are referred to by the Nos. of reference given above.

1 + 0".93 = + 0·815 × e + 0·543 × f − 0·815 × x − 0·544 × y − 0·203 × t
− 1·720 × m − 0·942 × n.

2 + 7·39 = + 0·921 × e − 0·322 × f − 0·921 × x + 0·321 × y − 0·423 × t
+ 1·592 × m − 0·942 × n.

3 − 7·08 = − 0·747 × e + 0·641 × f + 0·747 × x − 0·641 × y + 0·444 × t
− 2·884 × m − 0·941 × n.

4 + 7·53 = + 0·902 × e + 0·132 × f − 0·902 × x − 0·134 × y − 0·497 × t
+ 0·892 × m − 0·991 × n.

5 + 9·21 = + 0·845 × e − 0·376 × f − 0·845 × x + 0·374 × y − 0·496 × t
+ 2·718 × m − 0·982 × n.

6 + 3·97 = + 0·212 × e − 0·975 × f − 0·212 × x + 0·975 × y − 0·268 × t
+ 3·366 × m − 0·960 × n.

7 + 0·91 = + 0·927 × e − 0·035 × f − 0·927 × x + 0·037 × y − 0·377 × t
− 1·140 × m − 0·887 × n.

8 −11·63 = − 0·941 × e + 0·593 × f + 0·941 × x − 0·592 × y + 0·447 × t
− 0·362 × m − 0·887 × n.

9 + 9·66 = + 0·922 × e − 0·078 × f − 0·922 × x + 0·080 × y − 0·375 × t
+ 0·929 × m − 0·890 × n.

10 − 9·75 = − 0·775 × e − 0·545 × f + 0·775 × x + 0·546 × y + 0·405 × t
− 0·276 × m − 0·890 × n.

11 + 3·94 = + 0·116 × e − 0·993 × f − 0·116 × x + 0·993 × y − 0·251 × t
+ 2·771 × m − 0·910 × n.

12 − 10·64 = − 0·828 × e − 0·556 × f + 0·828 × x + 0·556 × y + 0·270 × t
− 0·268 × m − 0·910 × n.

13 + 2 66 = + 0·427 × e − 0·882 × f − 0·427 × x + 0·883 × y − 0·258 × t
+ 0·895 × m − 0·882 × n.

14 − 9·21 = − 0·856 × e + 0·330 × f + 0·856 × x − 0·327 × y + 0·380 × t
− 2·083 × m − 0·891 × n.

15 + 5·23 = + 0·711 × e + 0·675 × f − 0·711 × x − 0·674 × y − 0·366 × t
− 1·611 × m − 0·901 × n.

16 − 7·19 = − 0·933 × e − 0·140 × f + 0·933 × x + 0·139 × y + 0·455 × t
+ 1·079 × m − 0·983 × n.

Phenomena of Jupiter's Satellites.

Day of Obs. 1872.	Satellite.	Phenomena.	Oxford Mean Solar Time of Observation. h m s	Greenwich Mean Solar Time from N. A. h m s	Observer.
Jan. 3	II.	Occ. reap. last contact	9 54 3·4	9 59	K.
8	I.	Ecl. dis. last seen	7 6 18·7	7 10 33·1	,,
15	I.	Occ. reap. first app.	11 15 14·0	11 21	,,
	I.	,, bisection	11 16 23·8		
	I.	,, last contact	11 17 43·6		
16	III.	Ecl. reap. first seen	11 58 54·9	12 1 47·2	L.
23	I.	Tr. ing. first contact	7 54 1·2	8 4	,,
	I.	,, last contact	8 2 4·9		
31	I.	Occ. dis. first contact	6 43 47·9	6 55	,,
	I.	,, last contact	6 51 36·6		
	I.	Ecl. reap. first seen	9 31 33·3	9 36 42·7	,,
Feb. 2	II.	Tr. ingr. first contact	9 58 13·6	10 6	,,
	II.	,, last contact	10 5 22·4		
8	I.	Tr. egr. first app.	8 13 17·9	8 19	K.
	I.	,, bisection	8 14 32·7		
	I.	,, last contact	8 16 2·4		
10	IV.	Ecl. reap. first seen	9 42 29·4	9 50 38·5	,,
	IV.	,, usual brightness	9 48 45·4		
17	III.	Tr. ingr. first contact	11 18 13·3	11 26	,,
	III.	,, bisection	11 22 12·7		
	III.	,, last contact	11 26 12·1		
20	II.	Tr. egr. last contact	6 43 43·7	6 46	L.
21	I.	Occ. dis. first contact	12 5 44·7	12 13	K.
	I.	,, last contact	12 10 14·0		
23	I.	Occ. dis. first contact	6 31 37·7	6 39	L.
	I.	,, bisection	6 34 47·2		
	I.	,, last contact	6 36 46·9		
Mar. 1	I.	Ecl. reap. first seen	11 39 54·3	11 45 2·0	,,
5	II.	Tr. ingr. first contact	8 30 1·0	8 38	,,
	II.	,, last contact	8 36 20·0		
	II.	Sh. ingr.	10 41 47·9	10 44	,,
	II.	Tr. egr. first app.	11 23 5·1	11 33	,,
	II.	,, last contact	11 30 4·0		

Jan. 3. Cloudy.

Jan. 8. The satellite disappeared very close to the edge of the planet, and became very faint before disappearing.

Jan. 16. Overcast, but the observation is satisfactory.

Feb. 21. Very faint; the planet tremulous and ill defined; light clouds.

Day of Obs. 1872.	Satellite.	Phenomena.	Oxford Mean Solar Time of Observation. h m s	Greenwich Mean Solar Time from N. A. h m s	Observer.
Mar. 6	III.	Occ. dis. first contact	8 6 51·7		
	III.	„ bisection	8 10 36·1	8 16	K.
	III.	„ last contact	8 14 35·4		
	III.	Occ. reap. first app.	11 36 10·6		
	III.	„ last contact	11 43 39·4	11 44	„
	III.	Ecl. dis. last seen	12 32 34·9	12 38 12·4	L.
9	I.	Tr. ingr. first contact	7 30 15·0		
	I.	„ bisection	7 32 44·6	7 37	K.
	I.	„ last contact	7 35 29·1		
	I.	Tr. egr. first app.	9 49 23·1		
	I.	„ bisection	9 51 37·7	9 56	„
	I.	„ last contact	9 54 7·3		
10	I.	Ecl. reap. first seen	8 3 53·5	8 9 7·5	L.
12	II.	Tr. ingr. first contact	10 56 59·5		
	II.	„ bisection	10 59 59·0	11 5	„
	II.	„ last contact	11 4 18·3		
13	III.	Occ. dis. first contact	11 47 37·1	11 55	K.
16	I.	Tr. ingr. first contact	9 20 59·5		
	I.	„ bisection	9 23 59·0	9 27	„
	I.	„ last contact	9 26 28·6		
	I.	Sh. ingr. first app.	10 35 44·6	10 38	L. & K.
	I.	„ well on disk	10 38 4·3		
Apr. 6	II.	Tr. egr. first app.	10 45 20·4		
	II.	„ bisection	10 47 35·0	10 54	K.
	II.	„ last contact	10 50 4·6		
8	I.	Tr. ingr. first contact	9 28 13·9		
	I.	„ bisection	9 30 58·4	9 35	„
	I.	„ last contact	9 33 43·0		
	I.	Tr. egr. first app.	11 50 20·8	11 54	„
	I.	„ clear of disk	11 56 19·8		
	IV.	Tr. egr. bisection	12 14 16·9	11 56	„
	IV.	„ last contact	12 20 15·9		
9	I.	Ecl. reap. first seen	10 14 26·0	10 19 34·8	L.
	I.	„ full brightness	10 15 36·9		

Mar. 6. Moisture on the object-glass, which rendered the eclipse of the third satellite less satisfactory than it would otherwise have been. It was about 40^s in entering the shadow of the planet.

Mar. 13. Cloudy.

Mar. 16. Cloudy at the ingress of the first satellite.

Apr. 8. The observations of the egress of the first satellite not very good, as *Jupiter* was seen through the branches of a tree. The " bisection " of fourth satellite not quite so satisfactory as the last contact, the satellite being very faint, and the planet seen through the branches of a tree.

Day of Obs. 1872.	Satellite.	Phenomena.	Oxford Mean Solar Time of Observation. h m s	Greenwich Mean Solar Time from N. A. h m s	Observer.
Apr. 11	III.	Ecl. reap. first seen	12 0 52·0	12 4 53·5	K.
	III.	„ usual brightness	12 3 5·6		
13	II.	Tr. ingr first contact	10 26 46·3	10 37	L.
	II.	„ last contact	10 34 15·1		
15	II.	Ecl. reap. first seen	10 55 40·9	11 1 5·9	K.
	II.	„ full brightness	10 56 43·2		
	I.	Tr. ingr. first contact	11 22 6·1	11 30	„
	I.	„ bisection	11 24 35·7		
	I.	„ last contact	11 27 35·2		
16	I.	Occ. dis. first contact	8 30 0·2	8 40	L.
	I.	„ last contact	8 36 9·2		
17	IV.	Ecl. reap. first seen	10 14 18·6	10 22 32·6	„
	IV.	„ fully seen	10 19 27·8		
	IV.	„ full brightness	10 22 27·3		
23	I.	Occ. dis. first contact	10 28 48·1	10 37	„
	I.	„ bisection	10 31 47·6		
	I.	„ last contact	10 34 47·1		
May 1	I.	Tr. ingr. first contact	9 45 52·6	9 52	K.
	I.	„ bisection	9 48 37·1		
	I.	„ last contact	9 51 51·6		

Apr. 15. The same remark applies to the ingress of I. as on April 8.

The initials M., L., and K., are those of Mr. Main, Mr. Lucas, and Mr. Keating.

The observations were generally made either with the Heliometer or with the 10-foot telescope, or with both. The 42-inch Dollond was used on November 15 and 16 by K. and on December 20 by L., for the occultations of stars.

On Photographic Irradiation in over-exposed Plates. By Lord Lindsay and Mr. A. Cowper Ranyard.

The most cursory observer of any of the recent corona photographs must have remarked the apparent eating-in of the prominences over the limb of the dark Moon. A more careful examination of the photographs shows that the whole limb of the Moon is more or less eaten into, and that the indentations under the prominences are only exaggerations of a phenomenon which is present at all parts of the limb, but which varies in intensity according as the dark limb of the Moon is projected on a brighter or less luminous background.

In all over-exposed photographs of luminous objects upon a dark background, the brighter parts of the picture are found to be surrounded by a nebulous haze or border of light, which